

1. A substantially purified nucleic acid molecule comprising an enhancer element having:

(a) 100% identity to 40 contiguous nucleotides of the nucleic acid molecule shown in SEQ ID NO.: 1 or SEQ ID NO.: 3;

5 (b) at least 91% identity to 50 contiguous nucleotides of the nucleic acid molecule shown in SEQ ID NO.: 2;

(c) at least 97% identity to 60 contiguous nucleotides of the nucleic acid molecule shown in SEQ ID NO.: 1 or SEQ ID NO.: 3; or

10 (d) at least 95% identity to 70 contiguous nucleotides of the nucleic acid molecule shown in SEQ ID NO.: 1 or SEQ ID NO.: 3.

2. The nucleic acid molecule of claim 1, wherein said element is naturally occurring.

3. The nucleic acid molecule of claim 1, wherein said element is non-naturally occurring.

15 4. The nucleic acid molecule of claim 1, wherein said nucleic acid molecule comprises a binding site selected from the group consisting of Mef2, dHAND, GATA, TGF- β , CarG, E-box, and Csx/Nkx2.5 binding sites.

5. The nucleic acid molecule of claim 4, wherein said nucleic acid molecule further comprises an Sp-1 binding site.

20 6. The nucleic acid molecule of claim 1, wherein said nucleic acid

molecule, when operably linked to a promoter, increases activity of said promoter by at least two-fold in a cardiac cell-specific manner.

7. A substantially purified nucleic acid molecule derived from a human, said nucleic acid molecule comprising a cardiac-specific enhancer element having

5 at least 60% identity to 50 contiguous nucleotides of the nucleic acid molecule shown in SEQ ID NO.: 1, SEQ ID NO.: 2, or SEQ ID NO.: 3.

8. A substantially purified non-naturally occurring nucleic acid molecule comprising at least three transcription factor binding sites selected from Mef2, dHAND, GATA, TGF- β , CarG, E-box, and Csx/Nkx2.5 binding sites.

10 9. A substantially purified nucleic acid molecule comprising an enhancer element having:

(a) 100% identity to 50 contiguous nucleotides of the nucleic acid molecule shown in SEQ ID NO.: 6;

(b) at least 97% identity to 60 contiguous nucleotides of the nucleic acid 15 molecule shown in SEQ ID NO.: 6;

(c) at least 93% identity to 70 contiguous nucleotides of the nucleic acid molecule shown in SEQ ID NO.: 6; or

(d) at least 90% identity to 100 contiguous nucleotides of the nucleic acid molecule shown in SEQ ID NO.: 6.

20 10. A substantially purified nucleic acid molecule derived from a human comprising a cardiac-specific enhancer element having at least 45% identity to 50

contiguous nucleotides of the nucleic acid molecule shown in SEQ ID NO.: 6.

11. A substantially purified nucleic acid molecule comprising 50 contiguous nucleotides that have a sequence that is at least 90% identical to 50 contiguous nucleotides of the nucleic acid molecule of SEQ ID NO.: 4 or SEQ ID 5 NO.: 5.

12. A DNA vector comprising the nucleic acid molecule of claim 1.

13. A method for inducing a cell to become a cardiomyocyte, said method comprising:

(a) introducing into said cell or ancestor thereof a DNA vector comprising 10 (i) the nucleic acid of claim 1; (ii) a promoter; and (iii) a cardiogenic gene operably linked to said promoter;

(b) culturing said cell under conditions that result in expression of said cardiogenic gene operably linked to said promoter, whereby expression of said cardiogenic gene further enhances expression of cardiogenic genes by binding to 15 cardiac-specific enhancer elements.

14. A method for specifically expressing a gene in a cardiac cell, said method comprising introducing into said cell or ancestor thereof a DNA vector comprising (i) the nucleic acid of claim 1; (ii) a promoter; and (iii) said gene operably linked to said promoter whereby said gene expresses said gene in cardiac cells 20 and does not express said gene in cells that are not cardiac cells.

15. A method for determining the efficacy of a method of inducing stem cells to produce or become cardiac cells, said method comprising:

(a) introducing into at least one of said stem cells or an ancestor thereof a DNA vector comprising (i) the nucleic acid of claim 1; (ii) a promoter; and (iii) a 5 gene operably linked to said promoter, said gene encodes a selectable marker;

(b) performing a method for potentially inducing at least a portion of said stem cells to produce or become cardiac cells;

(c) performing a drug selection, wherein cells expressing said gene encoding said selectable marker are capable of surviving in the presence of said 10 drug and cells not expressing said gene encoding said selectable marker are not capable of surviving in the presence of said drug; and

(d) determining the survival of cells following said drug selection, wherein a higher cell survival indicates a higher efficacy of said method of inducing stem cells to produce or become cardiac cells.

15 16. A method of identifying a cell as a cardiac cell, said method comprising introducing into said cell or an ancestor thereof a DNA vector comprising (i) the nucleic acid of claim 1; (ii) a promoter; and (iii) a reporter gene operably linked to said promoter, whereby said cell expresses said reporter gene if said cell is a 20 cardiac cell and said cell does not express said reporter gene if said cell is not a cardiac cell.

17. A method of substantially purifying a cardiac cell from a heterogeneous population of cells, said method comprising:

(a) introducing into at least a subset of cells in said population or ancestors

thereof a DNA vector comprising (i) the nucleic acid of claim 1; (ii) a promoter; and (iii) a reporter gene operably linked to said promoter, whereby a cell expresses said reporter gene if said cell is a cardiac cell and a cell does not express said reporter gene if said cell is not a cardiac cell; and

5 (b) determining whether a cell in said heterogeneous population is expressing said reporter gene, wherein said cell is purified from said heterogeneous population if said cell is expressing said reporter gene.